

We claim:

1. A method for brazing, comprising:

applying an alternating current across a work piece, said work piece having a discontinuity, to resistively heat a pre-placed filler metal to a temperature sufficient to melt said pre-placed filler metal, said pre-placed filler metal situated near said discontinuity such that said melted pre-placed filler metal is drawn into said discontinuity;

maintaining application of said alternating current for a set residence time; and

altering said application of said alternating current to achieve solidification of said filler metal.

2. The method of claim 1 wherein said alternating current is applied in series across said work piece.
3. The method of claim 1 wherein said work piece comprises a material selected from a metal and a ceramic.
4. The method of claim 1 wherein said work piece comprises a material selected from nickel, a nickel alloy, titanium, a titanium alloy, iron, a ferrous alloy (carbon, stainless steels, and cast iron), a refractory metal alloy, copper, a copper alloy, aluminum, an aluminum alloy, a ceramic, and an intermetallic compound.
5. The method of claim 4 wherein said ferrous alloy is selected from a stainless steel alloy, a cast-iron alloy, and a carbon-ferrous alloy.

6. The method of claim 1 wherein said filler metal comprises at least one material selected from copper, gold, nickel, aluminum, cobalt, and palladium.
7. The method of claim 6 wherein said filler metal is a copper-silver alloy
8. The method of claim 1 wherein said discontinuity has a maximum dimension across said discontinuity of 500  $\mu\text{m}$ .
9. The method of claim 1 wherein said residence time is less than 10 seconds.
10. The method of claim 1 wherein said residence time is less than 3 seconds.
11. The method of claim 1 wherein said alternating current is applied across said work piece by attaching clamps to said work piece, said clamps attached to an electrical current source.
12. The method of claim 1 wherein said alternating current is applied at a current of less than 5000 amperes and a voltage less than 5 volts.
13. The method of claim 1 wherein said alternating current is altered by reducing said current to less than 5000 amperes to achieve solidification of said filler metal.
14. A method for brazing, comprising:
  - applying an alternating current of greater than 1000 amperes across a nickel work piece, said work piece having a discontinuity, to resistively heat a pre-placed copper filler metal to a temperature of greater than 1085°C to melt said pre-placed copper filler metal, said pre-placed

copper filler metal situated near said discontinuity such that said melted pre-placed filler metal is drawn into said discontinuity;

maintaining application of said alternating current for a residence time greater than 0.5 minutes and less than 10 minutes; and

reducing the amperage of said alternating current to achieve solidification of said filler metal.